

# Stimulating Commercial and Research Utilization of the International Space Station Through a Competition

SPACE FLORIDA



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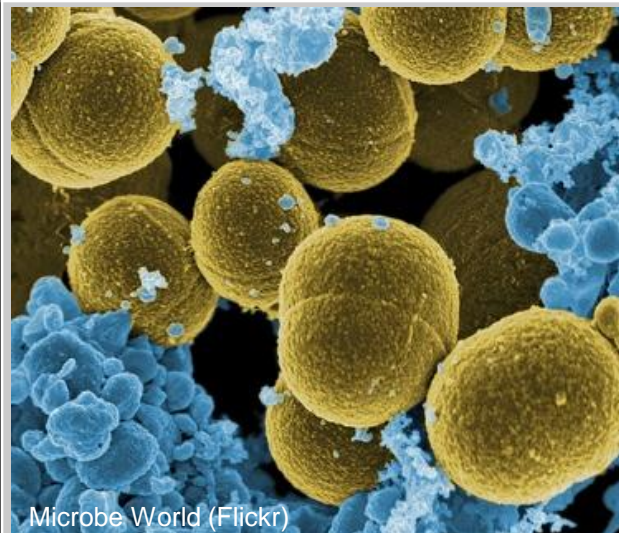


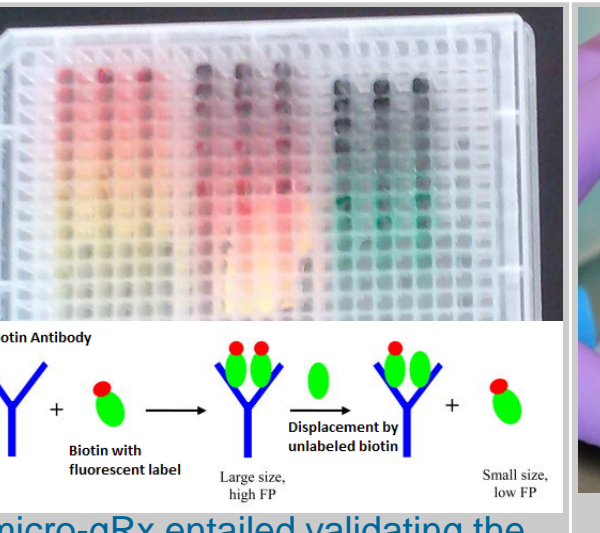

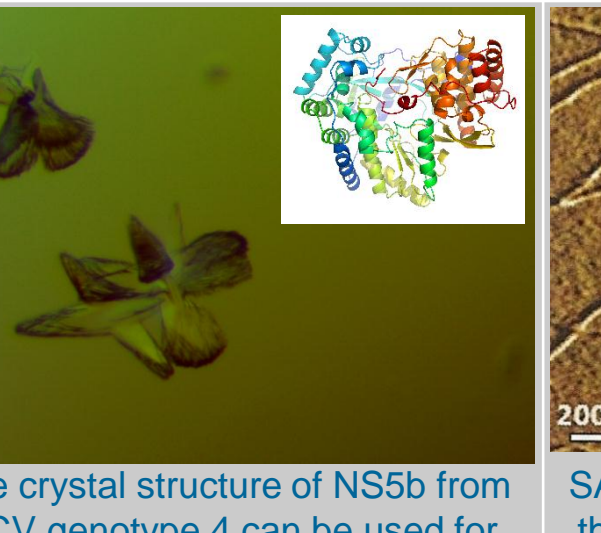
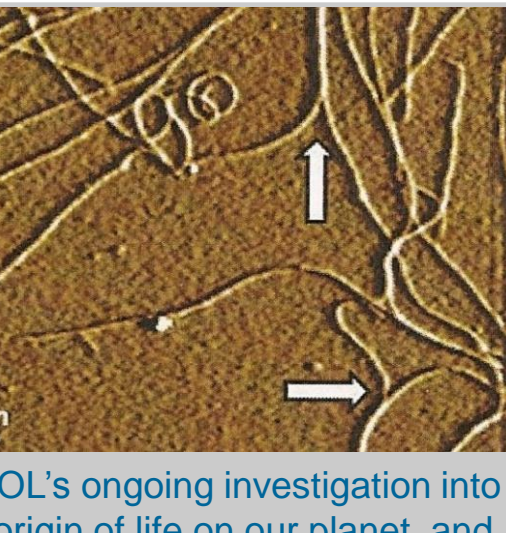
Space Florida, the state's aerospace and spaceport development authority, partnered with NanoRacks LLC, a hardware and services provider for the U.S. National Laboratory onboard the International Space Station (ISS), to create the Space Florida International Space Station Research Competition (ISSRC). The ISSRC was designed to inspire innovation as well as provide unique research opportunities and access to the ISS. The competition sought to introduce space research to a broader community of commercial research investigators, and to stimulate utilization of the ISS National Lab and the Space Life Sciences Lab (SLSL) in Exploration Park, Florida, USA.



SF/NR Agreement 25 MAY 2012    ISSRC Announced 10 SEP 2012    Workshop 5 OCT 2012    Proposals Due 31 OCT 2012    Winners Announced @ASGSR 5 DEC 2012    SpaceX CRS-3 18 APR 2014    SpaceX CRS-4 21 SEP 2014    SpaceX CRS-5 10 JAN 2015

## PAYLOADS FLOWN TO THE ISS

MERCCURI	HEART FLIES	NanoRocks	micro-gRx	SyNRGE <sup>3</sup>	EGAHEP	SABOL
Microbial Ecology Research Combining Citizen & University Researchers on ISS	Heart Effect Analysis Research Team conducting Fly Investigations and Experiments in Spaceflight	Collisional Evolution of Particles and Aggregates in Microgravity	Fluorescent Polarization in Microgravity: Validation of the M5 Microplate Reader Aboard the ISS	Symbiotic Nodulation in a Reduced Gravity Environment	Egypt Against Hepatitis C Virus	Self-Assembly in Biology and the Origin of Life (A study into Alzheimer's)
						
University of California-Davis / SciStarter.com / Science Cheerleader	Sanford-Burnham Medical Research I. / NASA Ames Research Center / Ohio State University / Stanford University	University of Central Florida	Sanford-Burnham Medical Research Institute at Lake Nona	Limerick Institute of Technology / CSS-Dynamac	German Aerospace Center (DLR) / Technical University of Munich	Florida Institute of Technology

SpaceX CRS-3 18 APR 2014 CCAFS, FL SLC-40	SpaceX CRS-3 18 APR 2014 CCAFS, FL SLC-40	SpaceX CRS-4 21 SEPT 2014 CCAFS, FL SLC-40	SpaceX CRS-4 21 SEPT 2014 CCAFS, FL SLC-40	SpaceX CRS-4 21 SEPT 2014 CCAFS, FL SLC-40	SpaceX CRS-4 21 SEPT 2014 CCAFS, FL SLC-40	SpaceX CRS-5 10 JAN 2015 CCAFS, FL SLC-40
						
Project MERCCURI was a citizen science effort in the USA to collect microbes associated with humans and to compare the growth of select microbes in space and on earth.	Drosophila (fruit flies) sent to the ISS were examined versus a medical ground study to understand the effects of space travel on astronaut cardiovascular systems.	Analysis of the damping of particle velocities provides information to model collisional evolution of particles in the protoplanetary disk as well as the collisional evolution of planetary rings, such as Saturn's.	micro-gRx entailed validating the ISS M5 microtiter plate reader using 3 modalities; absorbance, fluorescence intensity and fluorescence polarization (never been performed in microgravity).	Investigating the effect of microgravity on the cell-to-cell signaling and nodule formation between a host plant and symbiotic bacteria could lead to improving crop yields here on earth.	The crystal structure of NS5b from HCV genotype 4 can be used for both, <i>in silico</i> as well as <i>in vitro</i> drug screening. The structure gives accurate view of the active site which makes drug design much easier and efficient.	SABOL's ongoing investigation into the origin of life on our planet, and the understanding of Alzheimer's disease is done by investigating the spontaneous assembly of amyloid proteins into long linear fibers on the ground and space.
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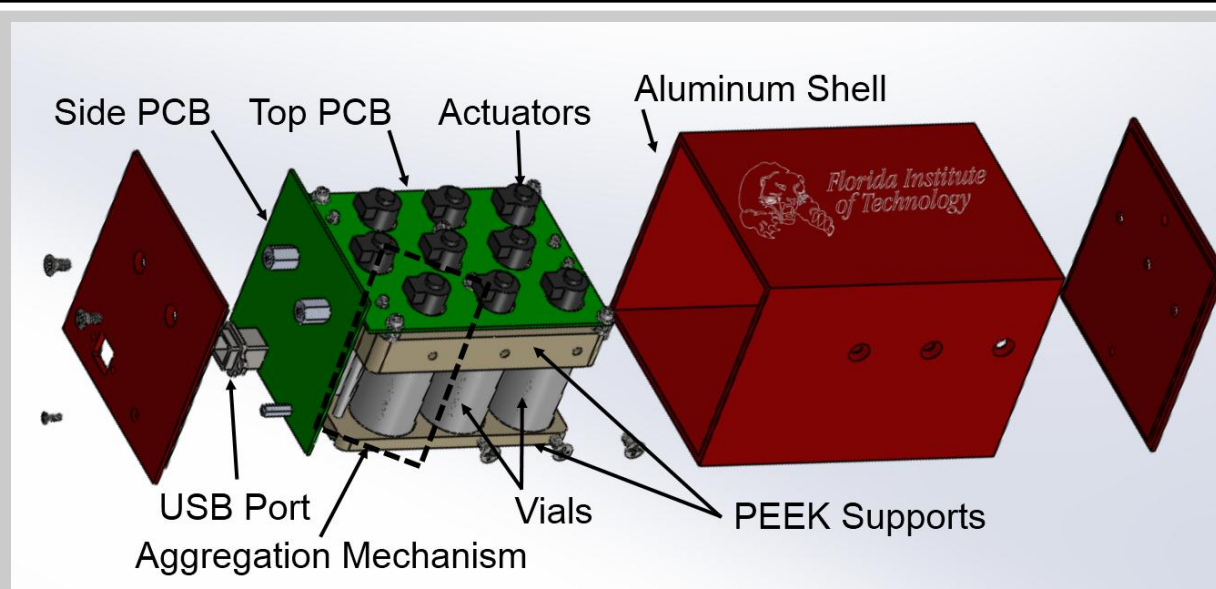
### ISSRC ECONOMIC IMPACT

**State of Florida investment: \$182,000**  
**Direct investment by teams: \$230,000**  
*Range of investment by teams: \$5,000 - \$60,000*  
*Labor not included in direct investment*

#### Team Highlights:

- Alfred P. Sloan Foundation grant 2010-2015
- EU Horizon 2020/EDEN-ISS grant 2014
- Florida-Israel Innovation Partnership award 2015
- Florida Space Research Program grantee 2014
- NASA Space Biology Program ISS Flight Experiment grant 2013
- 2 winners collaborated on serendipitous project
- 29+ Publications in progress

### EDUCATIONAL PAYLOAD EXAMPLE: SABOL



- Space hardware (plus ground control unit) designed, built, and tested by FIT with post-flight sample preparation and ongoing analysis
- 3 Faculty, ~25 Students (graduate and undergraduate levels)
- Significant contributions to at least 4 MS & 2 Ph.D. degrees
- University supported funds and labor
- Florida Space Research Program grantee 2014
- Research papers in progress
- Clubs involved: Student Rocket Society; Society of Physics Students; and Students for the Exploration and Development of Space

### OUTREACH & MEDIA IMPACT EXAMPLE: Project MERCCURI

**3000** #spacemicrobes samples from  
**83** venues with **1000's** involved.  
**66+** media features reached **32 Million**.



#### SLSL Highlights:

- Partnerships: Federal - State - Commercial - Academia  
 Security: Surveillance - Card Reader - Emergency Response  
 Information Technology: Wireless – VLAN - Government  
 Additional On-site Services:
- Central Services
  - Pharmacy
  - Work Shops
  - Analytical Chemistry
  - Bio-Molecular
  - Laboratory Equipment



### SPACE LIFE SCIENCES LAB (SLSL), EXPLORATION PARK, FL

The SLSL serves as the primary gateway for payloads bound for the ISS and suborbital research. This unique facility serves as the anchor for Exploration Park, a 400-acre research and technology park located on Federal property just outside at Kennedy Space Center. The park is an ideal location for businesses and research groups with a need for close proximity to the launch and landing facilities and technical capabilities at the Cape Canaveral Spaceport.



SLSL provides infrastructure to enable ISS research including non-exploration research and maturation of critical exploration technologies. It reduces mission risk at the launch site and assures payload support capabilities. The SLSL provides access to wet labs and research space and the opportunity to access experimental space research capabilities through Center for the Advancement of Science in Space (CASIS).

